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REMARKS

The Examiner objected to Claim 1, suggesting that the word "relative" should be inserted between "said" and "position". Claim 1 has been amended accordingly.

The Examiner objected to Claim 3, suggesting that "said spherical element" should be changed to "said moveable element" to provide proper antecedent basis for the limitation in the claim. The Claim has been amended accordingly.

The Examiner rejected Claims 1 and 3-9 under 35 U.S.C. 103(a) as being unpatentable over Liebenow (US 6,078,312) in view of Rosenberg, *et al* (hereafter "Rosenberg")(US 2005/000 9605). Applicant traverses the rejection of these claims.

With regard to Claim 1, the Examiner states that Liebenow teaches all the elements of the Claim except for the memory for storing a map specifying readable patterns. The Examiner looks to Rosenberg for the missing teachings. The Examiner maintains that it would have been obvious to "modify the optical input device of Liebenow with the movement detection DSP of Rosenberg in order to provide a detection of the exact location of the control stick within its range of motion (Liebenow, col. 2, lines 39-41)."

First, Applicant disagrees with the Examiner's reading of Liebenow. The Examiner identifies 64, 66, 98 as an imaging element (col. 7, lines 21-23, col. 9, lines 52-56) "that forms an image (as seen by the sensors 64, 66, 98) of a sub-area" of the surface of interest. Applicant assumes that the Examiner intended to point to elements 64, 66, and 68, not 98, as making up the imaging element in question. Applicant submits that these elements do not form an image of the surface, and hence, that Liebenow does not teach the imaging element required by Claim 1.

In this regard, Applicant submits that an image, being a representation of an object that resembles that object, requires at the very least two pixels, each pixel responding to light originating from a different location on the object being imaged. In the two-color implementation cited by the Examiner as relevant to the current invention, Liebenow teaches

(column 7, lines 57-60) that the two sensors 64 and 66 are typically photdiodes. Each photodiode responds to a different wavelength band of the light originating from the light source 68 and reflecting off the surface of interest. Only one data point is detected by each of the two photdiodes, and the two resulting data points represent the intensity of the corresponding wavelength bands of light reflected from the **same single** location on the object. Even if a CCD is used rather than simple photodiodes with external filters, still only two data points are detected, one for each wavelength band, and they both still represent a single location on the object, not an image of that object.

None of the implementations taught by Liebenow involve the formation of an image that could be received by any optical sensors. Indeed, Applicant submits that the essence of the device taught by Liebenow is the optical encoding of a surface, which results in a unique correspondence between the spectral content of the reflected light and each (x,y) location of the part of the surface that reflects that light. Hence, Applicant submits that there is no need for an image to be formed in the device taught by Liebenow, and that indeed no image is formed therein.

Second, Applicant disagrees with the Examiner's reading of Rosenberg. The Examiner points to the DSP in the system taught by Rosenberg as being "capable of providing Applicant's claimed map storing function". "The mere fact that a reference could be modified to produce the patented invention would not make the modification obvious unless it is suggested by the prior art." (*Libbey-Owens-Ford v. BOC Group*, 4 USPQ 2d 1097, 1103). "When the PTO asserts that there is an explicit or implicit teaching or suggestion in the prior art, it must indicate where such a teaching or suggestion appears in the reference" (*In re* Rijckaert, 28 USPQ2d, 1955, 1957).

The issue is not whether the DSP in Rosenburg is capable of performing a map storage function but rather whether Rosenburg teaches that it does so, or suggests a reason for modifying it to do so. The Examiner has not pointed to any teaching in Rosenberg of the DSP storing a map.

Furthermore, the Examiner has not pointed to any suggestion in Rosenberg that the DSP should be modified to store a map. Indeed, there would be no reason to make that

modification in the system taught by Rosenberg, since the system depends on comparing sequentially captured images with each other to determine motion, using well known image processing and correlating methods (Paragraph 25).

Hence, Applicant asserts that Rosenburg does not teach the storage of a map specifying a readable pattern, as required by the Claim limitation in question, and Rosenburg does not suggest such strorage. Additionally, of course, there is no teaching in Rosenberg regarding a controller that compares such a map with an image of the surface in order to determine position.

Third, Applicant disagrees with the motivation presented by the Examiner for combining the teachings of Liebenow and Rosenburg to arrive at an invention satisfying the limitations of Claim 1. Applicant submits that there would be no reason to modify the DSP taught by Rosenberg to store a map of the surface of interest in Liebenow. The device taught by Liebenow determines location by means of the two-dimensionally graded pattern on the curved dome (62 in Figure 5, 82 in Figure 6) which has a unique spectral signature for every position of interest. The device is essentially an encoder, and there is no need for a map of the surface to be stored. Hence, even if the DSP taught by Rosenberg were set up to store a map, there would be no advantage in adding that DSP to the device taught by Liebenow. Indeed, the passage pointed to by the Examiner, Column 2 lines 39-41, clearly states that the device already provides "a detection of the exact location of the control stick within its range of motion". Hence, Applicant submits that there is no motivation to further modify the device of Liebenow with the DSP of Rosenberg to arrive at the limitations of Claim 1.

Accordingly, Applicant submits that the Examiner has failed to make a *prima facie* case for obviousness with respect to Claim 1 and the Claims dependent therefrom.

With regard to Claim 9, the Examiner admits that Liebenow fails to disclose a plurality of search processors, each search processor comparing a portion of the stored map with the image formed by the imaging element. The Examiner suggests that as Rosenberg "teaches that the movement detector (56) may be implemented in any computing or processing environment, including computer hardware (paragraph [0025])" it can be taken as equivalent to including search processors. Applicant must disagree. The Examiner is, in

essence, arguing that the fact that a reference teaches a genus is sufficient to anticipate all species of that genus. The Examiner has not pointed to any law to support this proposition.

The Examiner suggests that "as it is well known in the computer art to use multiple processors to conduct a specific task to increase the speed of completing the task, it is obvious that one would use multiple processors to complete the sub-map comparing task described in Claim 9. First, Claim 9 requires a specific form of multiple processor system, i.e., one in which each search processor compares one portion of the stored map with the image obtained from the imaging processor. There is no teaching in Rosenberg of such a multiprocessor system. Second, there are problems in which parallel processing is not effective in reducing the computational time. The device taught by Liebenow is such a system. Third, the method taught in Liebenow does not compare an image to portion of a map. The algorithm taught in Liebenow determines the position of the surface by inerting the observed color intensities into a formula that specifices the x and y coordinates of the point. Hence, there is no reason to put such a parallel processing system into Liebenow.

Applicant submits that the Examiner has not pointed to any suggestion in Rosenberg, Liebenow or elsewhere in the prior art that would provide motivation for modifying the teachings and then combining the teachings of these references to arrive at a device that satisfies the limitations of Claim 9. Hence, there are additional reasons for allowing Claim 9.

With regard to Claim 8, the Examiner states that Liebenow fails to disclose a plurality of sub-maps that are rotated relative to one another. The Examiner looks to Rosenberg for the missing teachings. The Examiner suggests that it would have been obvious to modify the optical input device of Liebenow with the rotational detection of Rosenberg "in order to provide a device with detection in six different directions (Rosenberg, paragraph [0027])."

First, Applicant disagrees with the Examiner's reading of Rosenberg. The Examiner interprets Rosenberg as teaching "a series of rotated images (sub-maps)" that "may be compared to determine associated rotational movement of an element." Applicant submits that the passage cited by the Examiner actually explains that rotational position is typically detemined by comparing the images received from pairs of imagers viewing the surface of interest, one pair for each axis of interest, using known optical navigation techniques. Even in

a single camera implementation, "inverse kinematic computation techniques" are used to determine the rotational position. There is no teaching in Rosenberg regarding sub-maps or rotated images.

Second, the Examiner states that a DSP memory "is considered to have the capability of storing such rotated images for later use." Again, Applicant responds that the issue is not whether a DSP memory would have that capability, but whether Rosenberg either teaches that storage, or suggests a reason for modifying the memory to achieve that storage. The Examiner has not pointed to either that teaching or that suggestion.

Third, Applicant disagrees with the motivation suggested by the Examiner for combining the teachings of Liebenow and Rosenberg to arrive at the limitations of Claim 8. The device taught in Liebenow is only capable of determining the (x,y) location of the point that is over the detector. This device only measures the properties on a single point on the encoding surface. It is inherently incapable of measuring both rotation and position, since there is no way for the device to distinguish between the infinite number of possible rotations about the point that is currently over the detector. Hence, there is no reasor to store sub-maps that are rotated relative to one another. Accordingly, there are additional grounds for allowing Claim 8.

The Examiner rejected Claim 2 under 35 U.S.C. 103(a) as being unpatentable over Liebenow, in view of Rosenberg and further in view of Chen, *et al* (hereafter "Chen") (US 2003/002 0690). Applicant traverses the rejection.

The Examiner states that Liebenow as modified by Rosenberg fails to disclose that said pattern comprises a plurality of randomly distributed spots. The Examiner looks to Chen for the missing teachings. The Examiner maintains that it would have been obvious to modify the optical input device of Liebenow as modified by Rosenberg with the trackball having a random pattern of Chen "in order to allow the input device to correctly calculate a distance and direction of a movement of the moveable element (Chen, paragraph [0007])."

First, as noted above with respect to Claim 1 from which Claim 2 depends, Applicant submits that the combination of Liebenow and Rosenberg fails to teach the limitations

regarding a memory that stores maps of the surface, and a controller that compares the maps with the images of surface sub-areas. Chen does not provide the missing teachings.

Second, Applicant disagrees with the motivation suggested by the Examiner to make the combination of teachings required to satisfy the additional limitation in Claim 2 regarding the pattern of randomly distributed spots. The essence of the device taught by Liebenow is a non-random pattern, graded over one or two axes, such that each position to be detected has its own unique code that can be determined by measuring the intensity of light reflected from that spot in two different detectors. This allows the device to calculate exact position. Modifying the encoder device taught by Liebenow by including the randomly patterned trackball taught by Chen would result in an inoperable device, as the entire system is designed for use with a non-random surface pattern. Hence, Applicant submits that there would be no reasonable expectation of success in making the modification suggested by the Examiner.

Accordingly, Applicant submits that the Examiner has failed to make a *prima facie* case for obviousness with respect to Claim 2.

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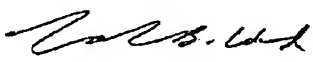
Respectfully Submitted,



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